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# Design and Implementation of Automatic Guided Vehicle for Waste Collection

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**ABSTRACT:** Automatic Guided Vehicle (AGV) are sometimes called self-guided vehicles that are material handling system or load carrying system. AGV are used in a variety of applications. They are often used for transporting raw materials such as metal, plastic, rubber or paper. This automatic guided vehicle can also be used to carry the waste and dump it to a proper place. In existing model, this AGV is a line follower robot. But it suffers from some problems. In the proposed model, this automatic guided vehicle is controlled through IOT communication. And as an additional feature fire detection is also implemented here. So this AGV will detect the presence of fire and pump water to extinguish fire. And a high level notification is given when the waste basket is overfilled. This vehicle is controlled using a Mobile App called Blynk. We present this model that is applicable in any sectors like Hospitals, Schools, Industries, Malls etc.

**KEYWORDS:** Automatic Guided Vehicle (AGV), Carry waste, Fire detection, High level notification, Mobile App (Blynk).

## I. INTRODUCTION

Technology is evolving day by day. As the population increases, the need for automation in the health care sector is essential. With the advancements of robotic technologies, different sectors are adopting more and more aspects of automation to enhance the services. On handling pandemic conditions such as COVID 19, the lives of health workers are in grave danger. Hence the health community finds difficulty in disposal of waste. They are in fear of getting diseases while working. Therefore, the development of an automatic guided vehicle (AGV) is important for waste management. The noticeable development in the field of power electronic converters and electric drives enhances the growth of AGV. Here the Automatic guided vehicle aims to carry the waste and dump it to a proper place. Thus it helps to reduce the labour cost, reduce environmental pollution, proper disposal of waste and save time. It also helps to reduce human interaction that will limit the spread of diseases.

The basic steps of this system are carrying waste and dump in proper place, helps in fire detection and pump water to extinguish fire, and finally it gives high level notification when the waste basket is overfilled. This vehicle is controlled using a Mobile App called Blynk. DHT 11 sensor is used to detect the presence of fire. And Ultrasonic sensor will help to give notification when the waste basket is overfilled. This AGV is applicable in any sectors like Hospitals, School, Industries, Malls etc. We can enhance this system by implementing camera using Raspberry pi, and also segregation of waste materials that collected.

Paper is organized as follows. In Section 2, we present a brief review of related works on the importance of emerging technologies for materials collection using AGV and robot navigation. In Section 3, we describe about methodology. In Section 4, We provide experimental result including image of working model. The model uses ultrasonic sensors and DHT 11 sensor, also this section including the sample images of mobile App Blynk. Finally, In Section 5, we present the effectiveness or working result of our monitoring robot.

## II. RELATED WORK

In this section, we briefly introduce related work done on the context Automatic Guided Vehicle (AGV). Automatic Guided Vehicle (AGV) are sometimes called self-guided vehicles that are material handling system or load carrying system. AGV are used in a variety of applications. They are often used for transporting raw materials such as metal, plastic, rubber or paper. An automated guided vehicle or automatic guided vehicle (AGV) is a robotic vehicle that follows along marked lines or wires on the floor, or uses radio waves, vision cameras, magnets, or lasers for navigation. They are most often used in Industrial applications, Hospitals, Schools and colleges and Malls etc. AGV can also store objects on a bed. AGV can also be called a laser guided vehicle (LGV). Lower cost versions of AGVs are often called Automated Guided Carts (AGC) and are usually guided by magnetic tape. The first AGV was brought to market in the 1950s, by Barrett Electronics.

Many models have been proposed to show the working of this Automatic Guided Vehicle (AGV) with different features. Transporting materials such as food, medicine in hospitals is also done with the help of AGV. On handling pandemic conditions such as COVID 19, the lives of health workers are in grave danger. Nurses and associated workers in the hospital are in fear of getting diseases while working in isolation wards. Therefore, the development of an automatic guided vehicle (AGV) is important for doing hospital functions like the supply of medicines, patient monitoring, and waste management [1]. This AGV is a line follower robot. It has infrared sensors for path identification and an ultrasonic sensor for obstacle detection. By using advanced technologies in locomotion and interfaces which ease the handling of the vehicle leads to transplant AGV, which is familiar in the manufacturing sector to hospital environments. [2]

On other method AGV robot is a programmable mobile robot integrated sensor device that can automatically perceive and move along the planned path [3]. This system consists of various parts like guidance facilities, central control system, charge system and communication system [4]. AGVs are applied in manufacturing factories and repositories for material handling. It has a wide application due to its high efficiency, flexibility, reliability, safety and system scalability in various task and missions. AGV operates all day long continuously that cannot be achieved by human workers. Therefore, the efficiency of material handling can be boosted by having the collaborating task with number of AGV [5].

Permanent Magnet Synchronous Motor (PMSM) control system for AGV is specified on many aspects like small size, high power density and low power consumption. AGV is an intelligent transport vehicle equipped with optical or electromagnetic guidance detection devices and capable of traveling along specified routes [6]. The whole frame of AGV is mainly composed of on-board controller, chassis drive device and guide detection device [7]. The chassis drive of AGV requires high control accuracy, small volume. And it has the characteristics of low voltage and high power density.

## III. METHODOLOGY

In this section, we describe the major hardware parts and how our model effectively works. Then we describe the second part of its working. IOT Technique is used in our system to control the automatic guided vehicle that carry waste materials and help to dump it in proper place. Using DHT 11 sensor fire in the surrounding is detected and pump water to extinguish fire. And with the help of Ultrasonic sensor a high level indication is given when the waste basket is overfilled. This vehicle is controlled using a Mobile App called Blynk.

#### IV. EXPERIMENTAL RESULTS

Figures show experimental result and hardware parts. Description about the components of the Hardware parts and it's working.

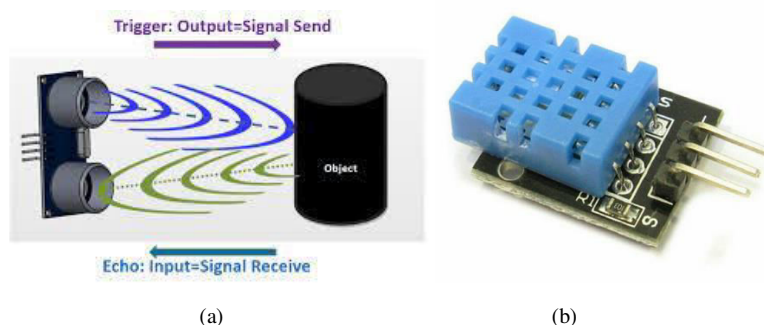


Figure 1 (a) shows that the image of Ultra sonic sensor. (b) is the image of DHT 11 sensor.

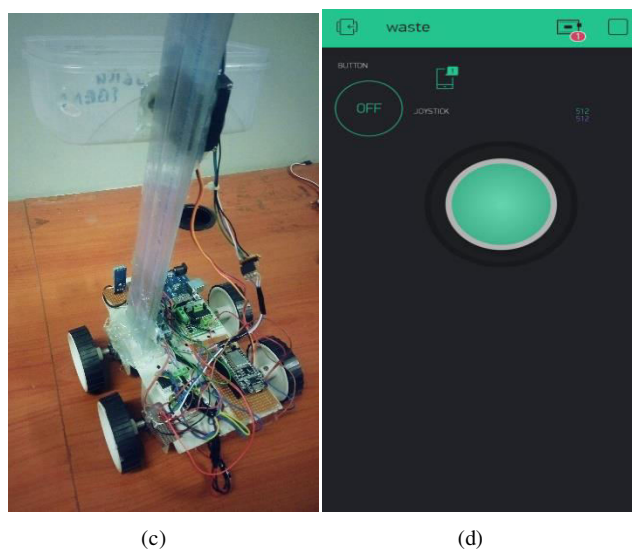


Fig. 2.(c) Working model of automatic guided vehicle (AGV) for waste collection (d) is the image of Blynk App used to control AGV

#### V. CONCLUSION

We have presented a system, an automatic guided vehicle that carries waste materials and dumpin proper place. This AGV is controlled through IOT communication. And this AGV will detect the presence of fire and pump water to extinguish fire. And a high level notification is given when the waste basket is overfilled. In the initial phase, we designed the basic block and circuitdiagram for the system. In the implementation phase, we executed the hardware with the help of IOT connecting technologies such as Blynk app. Extensive experiments conducted on IOT andother connecting technologies. This AGV helps to reduce the labour cost, reduce environmental pollution, proper disposal of waste andsave time. It also helps to reduce human interaction that will limits the spread of diseases.

We need to perform more studies on the social impact of such robots. Eventually, we want to evaluate the robot's performance in crowded public settings and outdoor scenarios. We can be enhanced this system by implementing camera using Raspberri pi, and also segregation of waste materials that we collected.





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